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SYSTEMS OF FARMING IN EASTERN AND SOUTHERN MINNESOTA

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DIVISION OF AGRICULTURAL ECONOMICS

UNIVERSITY FARM, ST. PAUL

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ILLUSTRATIONS

SYSTEMS OF FARMING IN EASTERN AND SOUTHERN MINNESOTA

L. F. GAREY and F. F. ELLIOTT[1]

INTRODUCTION

A study of the types of farming in Minnesota has been made, and, on the basis of this study, the counties have been grouped into seven type-of-farming areas. The counties in each of these areas have approximately the same proportion of crops and livestock, and the physical conditions in the counties of each are fairly uniform. The results of this study have been published in Minnesota Experiment Station Bulletin 257, Types of Farming in Minnesota.

Bulletin 268, which treats specifically of Areas VI and VII, is a supplement to Bulletin 257. This bulletin treats of Areas I, III, IV, and V. Because Areas III and V are somewhat similar they are treated together. No treatment of Area II is presented. It is the purpose of this bulletin to outline the situation in each area in greater detail than is done in Bulletin 257 and to illustrate ways in which this information may be helpful to farmers in determining suitable farming systems.

It is generally recognized that there is a wide variation in the agriculture of an area. No two farms or farmers are exactly alike. Consideration must be given to the wide variation of conditions under which a system of farming is carried on when making the application of results of specific farm management studies conducted in limited areas. In a small area where conditions are best suited to the production of a limited number of commodities, the variation in agriculture is less than in a large area where there is a greater range in the choice of commodities. In order that a better idea may be had of these variations and the extent to which they exist in a type-of-farming area, this supplemental publication presents an analysis of the organization of farms found in such an area. Townships representative of the conditions found in different parts of the area have been selected and the organization of each of the farms in these townships analyzed to determine the systems of farming that are representative on farms of different sizes.[2]

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THE DAIRY AREA, AREA I

Description of the Area

Because of different degrees of concentration in the production of dairy products and the combination of the dairy enterprise with other farm enterprises, the dairy area is subdivided into three parts, Part a, Southeast Dairy; Part b, East Central Dairy; and Part c, Northeast Dairy. The greatest concentration of dairy production occurs in the

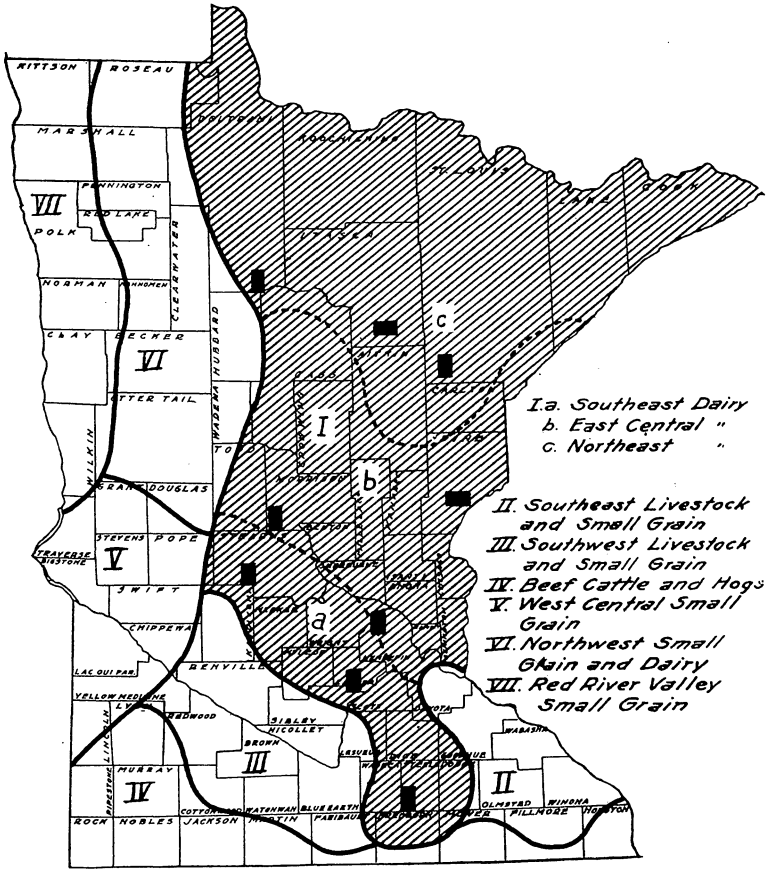

Fig. 1. Types-of-Farming Areas in Minnesota
Heavily shaded portions are townships from which data were taken in the study of Area I.

southern part of the area in Part a. The least concentration in production occurs in Part c. In the southern part of the area, in Part a, pork is produced in connection with the dairy products, particularly where corn is important. In the central part of the area, in Part b, potatoes are important and are the principal cash crop. In the northern part

of the area, in Part c, the agriculture is undeveloped and some sections of it are not suited to the production of agricultural products.

The soil in this area is of glacial origin except in the extreme southeastern part, where there is a narrow strip of wind-blown soil. In Part a, the outcroppings of boulders and rocks do not interfere seriously with cultivation. In some places in the northeastern portion of Part b, such outcroppings make cultivation difficult. In the eastern portion of Part c, there are many outcroppings of solid rock which make cultivation impossible. In addition to stones, there are lakes, swamps, hills, and timber that interfere with cultivation.

Where the land is tillable it is usually productive and grass crops do well. Leguminous crops thrive, and furnish an abundance of forage for the production of dairy products.

The precipitation varies from 32 inches in the extreme eastern portion of Part b to 24 inches in the western portion of Parts a and c. The section of 32 inches of precipitation is in the extreme eastern parts of Chisago and Pine Counties. Only in a small area in the western portion of Parts a and c is the precipitation as little as 24 inches. About 55 per cent of the precipitation comes between May 1 and August 31 in the southern part of the area, about 56 per cent in the middle, and 59 per cent in the northern part.

The growing season in the dairy area varies from 160 days, around the Twin Cities, to 100 days in the extreme northern part. The frost-free days in the southern part of the area average 150. The growing season along the shore of Lake Superior is longer than in the same latitude farther west, owing to the influence of the lake. The climate is well suited to the production of grass and hay and is one of the main reasons for the prominence of dairying.

The Twin Cities and Duluth are concentration centers for much of the agricultural products of this and other areas, as well as parts of Wisconsin and Canada. Railroads that pass through the principal agricultural sections provide shipping facilities. With the improvement in highways has come, also, a greater use of trucks for the transportation of agricultural commodities.

Shifts in the Acreage of Crops in Part a, 1879-1924

In the 45-year period from 1879 to 1924 some significant shifts in crop production took place in this part of the dairy area. Figure 2 shows the changes in relative importance in crop acreages which have occurred among the eight principal crops during the period.

There was a marked shift from wheat to feed crops from 1879 to 1924. Of the feed crops, corn increased most in relative importance. There was little change in the percentage of crop land occupied by oats

from 1889 to 1919, but a rather sharp increase took place during the next five years. Barley increased until 1909, decreased in 1919, and increased again by 1924. Hay fluctuated more than any other crop. It increased in 1889, decreased in 1899, then increased until 1919, after which there was a sharp decrease. Potatoes and flax changed but little from 1889 to 1924. No acreages were recorded for either of these

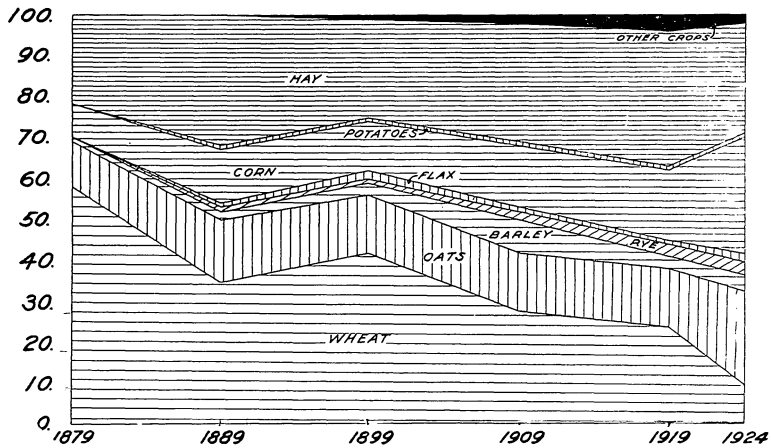

Fig. 2. Percentage of Crop Land Occupied by Crops Designated in Part a, 1879-1924

crops in 1879. Wheat had a continuous decrease in relative importance except in 1899. The percentage of crop land in wheat decreased from 57.5 in 1879 to 9.9 in 1924; that in oats increased from 10.9 to 22.9; in barley from 1.4 to 3.9; in rye from 0.1 to 3.3; in flax from 0 to 2.1; in corn from 8.1 to 28.6; in potatoes from 0 to 0.8; and in hay from 22.0 to 26.7. Miscellaneous crops occupied the rest of the crop land. The percentage of land devoted to strictly cash crops decreased from 57.6 per cent in 1879 to 16.1 in 1924.

Shifts in Number of Livestock per 100 Acres in Farms in Part a, 1880-1925

Table 1
Number of Head of Livestock per 100 Acres in Farms in Part a, 1880-1925*

	1880	1890	1900	1910	1920	1925
Dairy cows	2.4	4.0	4.7	6.3	7.2	8.1
Other cattle	3.2	4.6	6.0	5.7	6.5	5.0
Swine	0.6	1.2	1.5	1.7	2.1	2.5
Sheep	0.3	0.4	0.3	0.3	0.2	0.1
Horses	2.2	2.8	3.0	3.2	3.6	3.4

* Owing to different months in which the census was taken, the data for the census years are not strictly comparable. The error, however, is small.

Dairy cattle increased throughout the period, the increase after 1900 being 72 per cent. The number of other cattle per hundred acres in farms fluctuated. It increased up to 1900, decreased in 1910, increased in 1920, and decreased again in 1925. The number of swine increased throughout the period, but at a faster rate than the corn acreage increased. A larger percentage of the corn crop was used for silage in this part of the area than in the areas to the west, where dairy cattle were less numerous. There was no significant change in the number of sheep for the first 30 years but the number declined during the last 15 years. Horses increased up to 1920 but decreased during the next five years.

Shifts in the Acreage of Crops in Part b, 1879-1924

In Part b there was a marked decrease in the relative importance of wheat throughout the period. Wheat occupied 11.2 per cent more of the crop land in 1899 than it did in 1889 but less thereafter. Oats

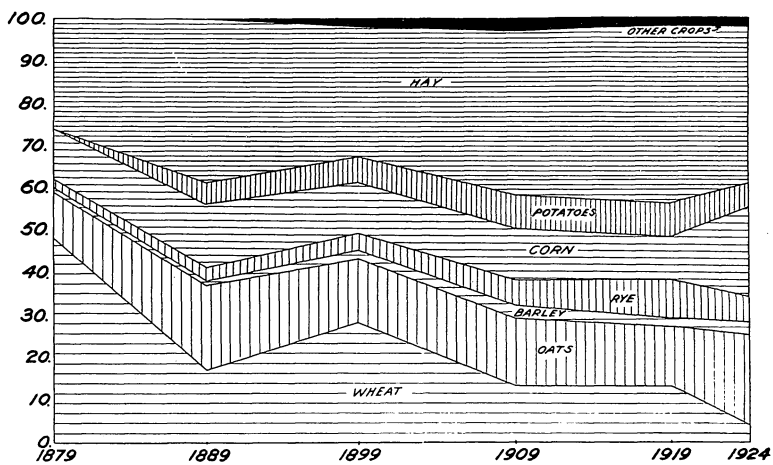

Fig. 3. Percentage of Crop Land Occupied by Crops Designated in Part b, 1879-1924
Flax occupied less than half of one per cent of the crop land so was omitted from the figure.

fluctuated in importance, increasing in one census year and decreasing the next throughout the period. Only one per cent more of the crop land was devoted to oats in 1924 than in 1889, and only 3.7 per cent less in 1879 than in 1919. Barley increased up to 1909, after which there was little change. Corn increased in 1889, after which it decreased until 1919. For the five-year period from 1919 to 1924, corn increased in relative importance 118 per cent. Potatoes increased up to 1919, after which there was a small decrease. Hay increased in all but two census years throughout the period. One decrease was in 1899 when

there was a big increase in wheat and the other was in 1924 when both corn and oats had rather marked increases.

The percentage of crop land occupied by wheat decreased from 48.2 in 1879 to 3.9 in 1924; oats increased from 10.7 per cent of the crop land to 21.0; barley from 1.0 to 2.7; rye from 1.5 to 5.9; corn from 11.8 to 20.7; potatoes from 0 to 6.4; flax from 0 to 0.4, and hay from 26.8 to 36.7. Other miscellaneous crops occupied the remainder of the crop land. The percentage of strictly cash crops decreased from 49.7 per cent of the crop land in 1879 to 16.6 in 1924.

Shifts in the Number of Livestock per 100 Acres in Farms in Part b, 1880-1925

Table 2
Number of Head of Livestock per 100 Acres in Farms in Part b, 1880-1925*

	1880	1890	1900	1910	1920	1925
Dairy cows	2.5	3.4	3.3	5.1	6.2	7.0
Other cattle	3.5	3.7	4.4	4.3	5.1	3.6
Swine	0.5	0.7	0.7	0.6	0.8	0.8
Sheep	0.3	0.2	0.2	0.2	0.3	0.2
Horses	1.8	2.1	2.4	2.5	2.9	2.6

* Owing to different months in which the census was taken, the data for the census years are not strictly comparable. The error, however, is small.

The number of dairy cows per hundred acres in farms increased 180 per cent during the 45-year period, a much faster rate than that of other kinds of livestock. Other cattle numbered almost as many per hundred acres in farms in 1880 as in 1925, altho in 1920 their number was the highest at any time during the 45-year period. The number of swine changed little, doubtless because of the small change in corn. The number of horses increased until 1920, when they decreased.

Shifts in the Acreage of Crops in Part c, 1879-1924

By observing Figure 4, one is impressed with the large amount of crop land occupied by hay in Part c. Hay was least important in the cropping system in 1879. Its importance increased and decreased in alternate census years. There was no definite trend with any of the crops. Both barley and rye were relatively unimportant in 1889 and flax and rye in 1909. Oats were next to hay in acreage but were less important during the 20-year period from 1889 to 1909 than they were either before or after that period. Potatoes were relatively unimportant before 1889. They were more important during the 30-year period, 1889 to 1919, than they were in 1924. Corn increased from 1919 to 1924. Wheat decreased and increased in relative importance in alter-

nate census years. The percentage of crop land occupied by wheat decreased from 10.2 in 1879 to 0.8 in 1924; oats from 20.0 to 13.4; barley from 4.3 to 1.7; rye from 8.5 to 1.0. Corn increased from 2.5 per cent of the crop land in 1879 to 3.7 in 1924; flax from 0 to 0.8;

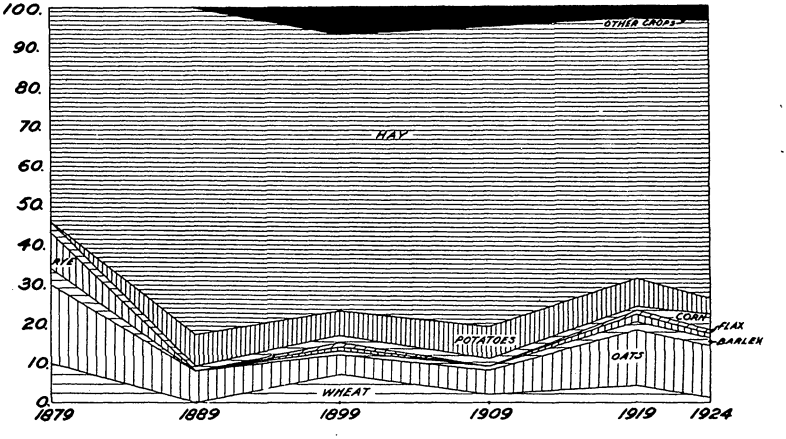

Fig. 4. Percentage of Crop Land Occupied by Crops Designated in Part c, 1879-1924

potatoes from 0 to 4.5, and hay from 54.5 to 70.4. No other crops were reported in 1879 or 1889, but they occupied 7.0 per cent of the crop land in 1899 and 3.7 in 1924. The strictly cash crops occupied 18.7 per cent in 1879 and 7.1 in 1924.

Shifts in the Number of Livestock per 100 Acres in Farms in Part c, 1880-1925

Table 3
Number of Head of Livestock per 100 Acres in Farms in Part c, 1880-1925*

	1880	1890	1900	1910	1920	1925
Dairy cows	1.8	1.7	1.7	2.2	2.7	3.2
Other cattle	2.7	2.1	2.4	2.0	2.6	2.1
Swine	0.1	0.2	0.2	0.1	0.2	0.1
Sheep	0.1	0.1	0.1	0.1	0.3	0.1
Horses	0.5	0.8	0.1	1.0	1.5	1.4

* Owing to different months in which the census was taken, the data for the census years are not strictly comparable. The error, however, is small.

There were no marked changes in livestock in Part c throughout this 45-year period. The number of dairy cattle increased 78 per cent and of horses 180 per cent. The numbers, however, were so small that the increase was not particularly significant. No change of importance occurred in the other classes of livestock.

Typical Farm Organizations Followed (1925) in Area I

Records of the Federal census were used as a basis for determining the typical organizations followed on farms of different sizes in the area. Nine representative subareas, located in Steele, Carver, Stearns, Hennepin, Morrison, Pine, St. Louis, Itasca, and Beltrami Counties, were selected. Each sub-area included three to five townships. About 1,100 farms were included in Part a, 960 in Part b, and 1,000 in Part c.

These farms were grouped according to size. The groups were then subdivided on the basis of the amount of feed crops produced in the subarea. The amounts of the other enterprises were included in order to show the complete organization of each farm. The farms with the same, or essentially the same, organization were considered typical of the subarea and the average or most common organization made up the typical farming system. From one to three common systems of farming were found in each group.

In Tables 4 to 12 are given the farm organizations commonly found in the subareas. Below each table is given the percentage that each of the different sized farms constituted of the total number of farms. For example, the most common size in Table 4 is 240 acres, which constitutes 32 per cent of all farms. The 160-acre farm is the next most common, constituting 29 per cent of all farms. In the line "Frequency of Type" is given the percentages of farms of the same size having the specific organization indicated.[3]

[3] Typical farming systems, as indicated in the preceding tables, provide farmers in a locality a basis for testing and appraising the relative profitableness of different systems as well as long-time and year-to-year adjustments. They present a picture of the common organizations found and enable a farmer to make a comparison of his own organization with that commonly found in his locality.

The information on production practices, crop yields, livestock production, and labor requirements and distribution are available from other sources. Such information for specific localities in Minnesota is given in Minnesota Experiment Station Bulletin 205, Technical Bulletin 44, and in unpublished reports. These will be useful as guides in considering the requisites of a particular farming system in a locality.

Table 4

Typical Farming Systems on Farms of Different Sizes in Stearns County, Part a

Special Tabulations of the 1925 Census.

Item	Typical 120-acre farms*		Typical 160-acre farms*			Typical 240-acre farms*			Typical 280-acre farms*		Typical 320-acre farms*	
Frequency of type in per cent	44	48	38	40	16	17	44	37	31	55	36	46
Crops—												
Feed crops, acres	35	65	45	65	85	47	70	105	70	105	90	110
Corn, acres	15	28	18	30	30	20	30	40	28	45	35	45
Oats, acres	18	25	18	25	35	18	30	45	32	45	37	50
Barley, acres	..	6	5	6	11	7	6(0–18)	14	7	8	10	10
Tame hay, acres	2	6	4	4	9	2(0–8)	4	6	3	7	8	5
Wheat, acres	15	10	20	15	7	35	25	10	28	18	37	25
Flax, acres	3	..	0 or 10‡	..	6	6(0–10)	10	6	6	7	10	15
Rye, acres	8	..	..	10	0 or 15†	12	12	5	23	10	22	23
Potatoes, acres	1	½	½	½	½	½	1	½	½	½	½	¾
Buckwheat, acres	..	..	..	..	..	0 or 8†	0 or 15‡	0 or 10‡	..	0 or 15†	..	10
Wild hay, acres	15	15	25	22	25	25	35	30	40	45	50	45
Pasture, acres	33	25	50	40	30	80	60	65	85	65	80	75
Other land, acres	10	5	15	8	7	35	20	15	25	25	30	15
Livestock—												
Horses, number	4	5	5	5	5	5	6	6	7	7	8	8
Cows, number	11	13	11	12	13	14	15	19	20	22	21	17
Other cattle, number	4	4	6	5	7	6	8	7	10	8	10	12
Sows, number	2	0 or 5	5	4	5	5	4	6	4	6	6	3
Other hogs, number	0–20	0–25	0–20	0–30	5–20	0–20	0–20	0–30	0–30	5–30	0–20	10–30
Poultry, number	100	100	90	100	120	80	100	100	125	140	125	125
Per cent of farms having tractors	9	33	6	8	32	12	22	33	33	45	50	50

* The farms of different sizes represent the following percentages of all farms: 120-acre farms 8, 160-acre farms 29, 240-acre farms 32, 280-acre farms 10, 320-acre farms 9.

† The common thing is to have none.

‡ About half have none. The average acreage was used in making up the total farm acreage.

Table 5

Typical Farming Systems on Farms of Different Sizes in Steele County, Part a

Special Tabulations of the 1925 Census.

Item	Typical 80-acre farms*		Typical 120-acre farms*			Typical 160-acre farms*			Typical 200-acre farms*		Typical 240-acre farms*
Frequency of type in, per cent	40	55	18	47	35	15	43	42	43	55	87
Crops—											
Feed crops, acres	35	50	40	60	80	55	80	105	90	110	100
Corn, acres	17	20	21	25	32	27	40	40	40	45	40
Oats, acres	14	16	16	19	23	24	25	36	25	35	30
Barley, acres	..	3	..	5	0 or 10‡	..	5	5	9(0–15)	13	10
Tame hay, acres	4	11	3	11	20	4	10	24	16	17	20
Wheat, acres	0 or 10†	0 or 10†	4	4	0 or 10‡	11	0 or 10‡	0 or 10†	7	0 or 10‡	5(0–15)
Rye, acres	..	..	0 or 7‡	2	..	0 or 12‡	0 or 10‡	..	0 or 10‡	0 or 10‡	10
Potatoes, acres	¼	¼	¼	¼	½	½	½	½	½	½	½
Wild hay, acres	10	4	25	14	4	30	20	8	19	17	24
Pasture, acres	25	17	38	30	25	45	40	35	60	45	80
Other land, acres	10	9	9	10	6	15	10	12	19	16	20
Livestock—											
Horses, number	4	4	4	5	5	5	6	6	7	7	7
Cows, number	9	10	11	12	13	14	16	17	17	18	20
Other cattle, number	4	5	5	5	5	7	7	7	7	9	10
Sows, number	3	5	4	6	7	5	8	10	7	10	10
Other hogs, number	0–20	0–25	0–8	0–25	0–25	0–20	10–40	5–40	10–35	10–35	
Poultry, number	120	120	140	125	140	100	125	150	120	125	125
Per cent of farms having tractors	4	9	15	20	16	20	23	25	40	40	50

* The farms of different sizes represent the following percentages of all farms: 80-acre farms 20, 120-acre farms 24, 160-acre farms 30, 200-acre farms 12, 240-acre farms 5.

† The common thing is to have none. Not used in making up the total farm acreage.

‡ About half have none. The average acreage was used in making up the total farm acreage.

Table 6

Typical Farming Systems on Farms of Different Sizes in Carver County, Part a

Special Tabulations of the 1925 Census.

Item	Typical 40-acre farms*		Typical 80-acre farms*			Typical 120-acre farms*			Typical 160-acre farms*				Typical 200-acre farms*	
Frequency of type in per cent.....	30	55	24	44	31	20	44	36	13	23	40	24	37	63
Crops—														
Feed crops, acres.....	15	25	30	40	50	38	55	70	35	60	80	100	75	100
Corn, acres	6	9	11	13	18	15	20	24	15	18	28	35	26	37
Oats, acres	5	6	9	10	15	11	10	20	10	15	25	25	24	30
Barley, acres	..	..	..	3	..	..	3(0–6)	..	..	5	..	2(0–10)	..	..
Tame hay, acres.....	4	10	10	14	17	12	22	26	10	22	27	38	25	33
Wheat, acres	2(0–4)	2	9	6	5	14	6	10	15	25	15	8	14	20
Rye, acres	..	..	..	2	..	8	..	..	3	1	2	..	4	..
Wild hay, acres.....	4	..	2	1	..	3	..	..	14	..	2	1	..	..
Potatoes, acres	½	½	½	½	½	½	½	½	½	½	½	½	½	¾
Pasture, acres	15	10	33	28	20	50	50	30	80	63	50	45	90	65
Other land, acres.....	3	2	5	3	5	7	8	9	12	10	10	5	16	14
Livestock—														
Horses, number	2	2	3	4	4	4	4	5	4	5	5	5	6	7
Cows, number	5	8	10	11	13	14	16	18	15	18	20	18(12–28)	22	24
Other cattle, number.....	2	3	5	4	5	5	7	8	5	8	9	10	11	12
Sows, number	2	2	3	4	4	4	5	5	2	4	5	7	7	8
Other hogs, number.....	4	4(0–12)	8(0–20)	12(5–25)	13(0–25)	7(0–25)	0–30	0–30	0–25	0–25	7–30	6–40	7–40	14–45
Poultry, number	150	100	120	125	150	150	175	150	200	150	150	150	175	150
Per cent of farms having tractors...	0	7	3	3	20	20	20	30	0	21	25	21	65	40

* The farms of different sizes represent the following percentages of all farms: 40-acre farms 6, 80-acre farms 30, 120-acre farms 27, 160-acre farms 21, 200-acre farms 6, 240-acre farms 4.

Table 7

Typical Farming Systems on Farms of Different Sizes in Morrison County, Part b

Special Tabulations of the 1925 Census.

Item	Typical 80-acre farms*			Typical 120-acre farms*		Typical 160-acre farms*			Typical 200-acre farms*	
Frequency of type in per cent	24	40	36	53	43	31	42	23	42	46
Crops—										
Feed crops, acres	8	15	30	16(10–23)	33(23–45)	17	30	50	30	60
Corn, acres	3	4	9	5	8	6	10	13	8	22
Oats, acres	4	7	11	8	15	9	14	17	15	23
Barley, acres	..	..	..	..	..	..	..	5	..	..
Tame hay, acres	1	4	10	3	10	2	6	15	7	15
Wheat, acres	0 or 5†	..	..	0 or 5†	0 or 5†	2	0 or 12†	..	2	..
Rye, acres	..	..	..	..	..	0 or 5†	..	0 or 10†	..	..
Potatoes, acres	3	4	3	5(1–8)	5(1–10)	4	4	5	5	7
Wild hay, acres	14	10	7	20	15	24	25	17	23	25
Pasture, acres	49	45	40	65	60	88	85	80	100	100
Other land, acres	6	6	..	14	7	25	16	8	40	8
Livestock—										
Horses, number	2	2	3	3	3	3	4	4	4	5
Cows, number	5	9	9	11	12	11	12	17	15	17
Other cattle, number	3	4	5	5	5	8	7	10	8	12
Sows, number	0–2	1	1	2	2	2	2	3	2	3
Other hogs, number	0–5	0–6	0–5	0–5	0–12	0–13	0–15	2–10	2–10	4–15
Poultry, number	30	50	70	65	75	50	50	80	80	70
Per cent of farms having tractors	0	0	0	2	0	0	0	7	0	15

* The farms of different sizes represent the following percentages of all farms: 80-acre farms 27, 120-acre farms 26, 160-acre farms 21, 200-acre farms 8, the rest of the farms were too much scattered to group.

† The common thing is to have none. Not used in making up the total farm acreage.

Table 8

Typical Farming Systems on Farms of Different Sizes in Pine County, Part b

Special Tabulations of the 1925 Census.

Item	Typical 40-acre farms*		Typical 80-acre farms*			Typical 120-acre farms*			Typical 160-acre farms*			Typical 200-acre farms*
Frequency of type in per cent	50	50	27	54	18	30	40	30	35	30	30	80
Crops—												
Feed crops, acres	7	19	10	23	35	14	38	55	20	40	70	50
Corn, acres	2	2	2	4	4	3	8	10	4	9	8	7
Oats, acres	2	5	4	7	11	4	12	15	7	15	20	17
Barley, acres	..	..	..	..	..	..	..	..	..	..	..	..
Tame hay, acres	3	12	4	12	20	7	18	30	9	16	42	26
Potatoes, acres	2	2	2	3	3	3	5	5	2	3	5	5
Wild hay, acres	2	..	5	4	3	8	5	0 or 10†	8	7	0 or 5†	10
Other crops, acres	1	1	1	..	..	..	..	..	..	..	..	..
Pasture, acres	23	15	50	40	35	85	62	50	80	70	75	95
Other land, acres	5	3	12	10	4	10	10	10	50	40	10	40
Livestock—												
Horses, number	2	2	2	2	3	3	3	4	3	4	4	4
Cows, number	4	5	5	6	8	6	9	10	8	9	13	7
Other cattle, number	2	2	4	4	3	4	5	6	4	6	8	6
Sows, number	0	0	0–1	0–2	1	0–2	1	0–2	1	2	2	1
Other hogs, number	0–2	0–3	0–5	0–10	0–6	0–8	0–15	0–6	0–5	0–7	0–7	0–16
Poultry, number	40	60	30	40	50	40	40	50	60	40	40	50
Per cent of farms having tractors	5	0	0	1	0	0	5	7	0	20	22	20

* The farms of different sizes represent the following percentages of all farms: 40-acre farms 13, 80-acre farms 40, 120-acre farms 16, 160-acre farms 16, 200-acre farms 4.

† The common thing is to have none. Not used in making up total farm acreage.

Table 9

Typical Farming Systems on Farms of Different Sizes in Hennepin County, Part b

Special Tabulations of the 1925 Census.

Item	Typical 40-acre farms*		Typical 60 acre farms*		Typical 80-acre farms*			Typical 120-acre farms*		Typical 140-acre farms*		Typical 160-acre farms*	
Frequency of type in per cent	41	55	35	63	30	54	14	48	50	48	52	46	43
Crops—													
Feed crops, acres	10	22	18	30	20	32	45	34	50	30	60	35 (27–48)	60 (51–75)
Corn, acres	5	7	8	13	9	13	13	14	18	14	22	16	25
Oats, acres	3	7	6	9	8	11	13	10	16	12	20	16	20
Barley, acres	..	..	..	..	..	2(0–5)	4	2	2	..	..	..	..
Tame hay, acres	2	8	4	8	3	6	15	8	14	4	18	3	15
Wheat, acres	1(0–6)	2(0–8)	4	3	4	4	0 or 5†	6	5	13	4	9	7
Rye, acres	..	..	..	..	..	..	..	2	..	2	..	4(0–10)	..
Potatoes, acres	1½	1½	2	3	3	2	3	4	4	2	4	2(0–5)	4(1–10)
Wild hay, acres	10	2	8	6	18	13	7	22	16	30	15	30	27
Other crops, acres	..	..	..	..	..	..	..	..	..	..	0 or 3†	..	..
Pasture, acres	15	10	22	15	25	25	20	35	35	50	45	40	50
Other land, acres	2	2	6	3	10	4	5	17	10	13	12	40	12
Livestock—													
Horses, number	2	2	3	3	3	4	4	4	4	5	5	5	5
Cows, number	5	6	7	8	8	10	10	12	14	12	13	13	16
Other cattle, number	2	1	2	3	3	4	4	4	5	4	7	4	5
Sows, number	1	1	1	1	1	1	1	1	2	2	1	2(0–4)	2(0–6)
Other hogs, number	0–10	0–10	0–15	0–15	0–20	0–20	0–20	0–20	0–30	0–15	0–30	0–25	5–15
Poultry, number	60	80	80	80	80	80	80	90	100	75	80	90	90
Per cent of farms having tractors	0	3	0	5	2	7	0	14	18	8	0	12	25

* The farms of different sizes represent the following percentages of all farms: 40-acre farms 15, 60-acre farms 16, 80-acre farms 34, 120-acre farms 10, 140-acre farms 6, 160-acre farms 9.

† The common thing is to have none

Table 10

Typical Farming Systems on Farms of Different Sizes in St. Louis County, Part c

Special Tabulations of the 1925 Census.

Item	Typical 40-acre farms*			Typical 80-acre farms*			Typical 120-acre farms*			Typical 160-acre farms*		
Frequency of type in per cent	38	37	25	17	50	33	29	37	30	28	40	25
Crops—												
Feed crops, acres	5	12	22	3	13	30	10	24	45	12	31	47
Oats, acres	2	2	3	0 or 2†	3	5	3	4	5	4	6	7
Barley, acres	..	..	..	..	..	..	..	..	..	..	..	..
Tame hay, acres	3	10	19	3	10	25	7	20	40	8	25	40
Rye, acres	..	..	..	..	0 or 2†	1	..	2	1	1	..	1½
Potatoes, acres	½	½	1	1	1	2	1½	1½	2	2	1½	1½
Wild hay, acres	1	..	..	..	..	..	..	..	..	..	..	..
Pasture, acres	30	25	15	70	60	45	100	85	66	135	120	100
Other land, acres	4	2	2	6	6	2	8	7	6	10	7	10
Livestock—												
Horses, number	1	1	2	1	2	2	2	2	2	2	2	2
Cows, number	2	3	4	3	5	7	4	6	7	5	7	7
Other cattle, number	1	2	3	2	3	4	4	5	5	2	3	5
Sows, number	..	..	..	..	..	..	..	0–2	0–2	..	..	..
Other hogs, number	0–1	0–2	0–1	..	0–3	0–5	0–2	0–5	0–6	0–2	0–1	0–2
Poultry, number	10(0–25)	10(0–35)	15(0–40)	0–20	20(0–50)	20(0–50)	25(0–35)	25(0–40)	30(0–60)	40	15	20
Per cent of farms having tractors	0	3	10	0	0	2	0	12	20	0	0	0

* The farms of different sizes represent the following percentages of all farms: 40-acre farms 30, 80-acre farms 37, 120-acre farms 15, 160-acre farms 11.

† The common thing is to have none. Not used in making up total farm acreage.

Table 11

Typical Farming Systems on Farms of Different Sizes in Beltrami County, Part c

Special Tabulations of the 1925 Census.

Item	Typical 40-acre farms*		Typical 80-acre farms*			Typical 120-acre farms*		Typical 160-acre farms*	
Frequency of type in per cent	62	38	30	46	24	60	40	48	48
Crops—									
Feed crops, acres	4	12	0	14	29	12	27	12	31
Corn, acres	0–2†	0–3†	0 or 4†	1	2	2	3	2	4
Oats, acres	2	2	..	4	4	2	4	5	7
Tame hay, acres	2	10	..	9	23	8	20	5	20
Potatoes, acres	¾	¾	½	1	1	¾	2	1	2
Wild hay, acres	2	..	4	0 or 3†	..	2(0–10)	..	7	2
Pasture, acres	30	25	70	60	45	100	86	130	120
Other land, acres	3	2	5	5	5	5	5	10	5
Livestock—									
Horses, number	1	2	0–2	2	2	2	2	2	2
Cows, number	2	2	2	3	4	3	6	3	5
Other cattle, number	0–3	0–3	1	2	2	3	4	3	3
Sows, number	..	..	..	..	..	..	..	0–1†	0–2†
Other hogs, number	..	0–1†	..	0–2†	0–2†	..	0–1	0–2†	0–2†
Poultry, number	20	25	20	25	30	20	30	35	40
Per cent of farms having tractors	0	2	0	0	0	0	7	0	3

* The farms of different sizes represent the following percentages of all farms: 40-acre farms 30, 80-acre farms 30, 120-acre farms 11, 160-acre farms 19.
† The common thing is to have none. Not used in making up total farm acreage.

Table 12

Typical Farming Systems on Farms of Different Sizes in Itasca County, Part c

Special Tabulations of the 1925 Census.

Item	Typical 40-acre farms*		Typical 60-acre farms*		Typical 80-acre farms*			Typical 120-acre farms*		Typical 160-acre farms*		Typical 200-acre farms*	
Frequency of type in per cent	69	31	49	51	23	56	21	53	40	39	50	46	38
Crops—													
Feed crops, acres	5	15	8	20	5	15	30	12	40	13	37	23	45
Corn, acres	..	..	..	0–2†	..	2	2	..	2	2	5	4	4
Oats, acres	..	3	3	3	2	2	6	3	8	2	11	5	8
Tame hay, acres	5	12	5	17	3	11	22	9	30	9	21	14	33
Potatoes, acres	0–1†	1	1	1	1	2	4	1	2	1½	5	2	4
Wild hay, acres	..	..	..	..	..	0–3†	..	..	..	..	0 or 10†	..	1
Pasture, acres	33	22	47	35	70	60	43	100	75	140	115	170	145
Other land, acres	2	2	4	4	4	3	3	7	3	5	3	5	5
Livestock—													
Horses, number	0–2	0 or 2	2	2	0–2	2	3	2	2	2	2	3	4
Cows, number	1	2	2	3	2	3	4	4	5	3	70	5	7
Other cattle, number	1	1	0–2	2	1	3	4	4	5	3	4	4	4
Sows, number	..	..	..	..	0–1	..	0–1	..	..	..	0–1	..	..
Other hogs, number	0–2	0–3	..	0–2	0–3	0–3	0–3	0–2	0–2	0–2	0–2	0–6	0–6
Poultry, number	15	20	35	25	20	30	35	30	75	30	40	40	50
Per cent of farms having tractors	0	12	0	8	11	0	6	0	0	0	10	20	0

* The farms of different sizes represent the following percentages of all farms: 40-acre farms 29, 60-acre farms 10, 80-acre farms 30, 120-acre farms 10, 160-acre farms 8, 200-acre farms 8.

† The common thing is to have none. Not used in making up total farm acreage.

Use of Results in Determining Profitable Long-Time Systems of Farming

The problem confronting the farmer is to determine a system of farming that gives promise of yielding the greatest returns. It is necessary to consider the physical conditions on his farm, the long-time outlook for yields, and the probable prices of his products and of materials needed for production.

Tables 13 and 14 indicate a method which may be used in testing the results of a particular system of farming. The organization statement used in the tables is taken from a representative township in Stearns County, Part a. The 160-acre farm was used to demonstrate the method. On farms of this size, three organizations were commonly found. The chief difference was in the amount of feed crops grown and the numbers of livestock maintained. About 38 per cent of the farmers had an organization with 45 acres in feed crops, 40 per cent had 65 acres, and 16 per cent 85 acres. (See Table 4.)

Table 13

Statement of Organization and Production of Crops and Livestock and Disposal of Crops on Typical 160-Acre Farms in Part a, Stearns County

Crops	Acres	Yield	Production	Requirements		Salable surplus
				Feed	Seed	
Corn—Grain	24	34 bu.	816 bu.	810 bu.	6 bu.	..
Silage	6	6 tons	36 tons	36 tons	..	..
Oats	25	35 bu.	875 bu.	581 bu.	50 bu.	244 bu.
Barley	6	31 bu.	186 bu.	..	12 bu.	174 bu.
Wheat	15	14 bu.	210 bu.	..	23 bu.	187 bu.
Rye	10	18 bu.	180 bu.	..	15 bu.	165 bu.
Tame hay	4	1.5 tons	6 tons	6 tons	..	..
Wild hay	22	1.0 tons	22 tons	22 tons	..	..
Pasture	40	..	..	..	..	..
Other land	8	..	..	..	..	..

Livestock	No.	Production	Sold	Feed requirements			Supplementary feeds
				Grain	Roughage	Silage	
				lb.	lb.	lb.	lb.
Horses	5	.....	.....	15,000	25,000	.....	....
Cows	12	2,160 lb. butterfat 10 calves	3 cows 2,160 lb. b'fat 5 veal calves 700 lb. beef	16,400	26,000	60,000	3,000
Other cattle	5	.....	.....	1,250	5,000	12,000	....
Sows	4	6,000 lb. pork	6,000 lb. pork	27,000	....	.....	900
Poultry	100	400 doz. eggs 225 lb.	400 doz. eggs 225 lb.	4,000	....	.....	....

To illustrate the method of determining a long-time profitable organization, an estimate of the production of crops and livestock and

the disposal of crops is given in detail in Table 13 for the organization having 65 acres of feed crops. In Table 14 is given the statement of receipts and expenses and the returns to the organization above variable expenses for this system of farming. The returns for the other two organizations on the 160-acre farms—one with 45 acres of feed crops and one with 85 acres—are calculated in the same way, but only the returns to the organization are given.

This method demonstrates the returns that can be expected from these organizations, with specified yields and prices. The crop yields were recorded in the townships from which the data were taken. The same rate of production from livestock has been used for the different systems of farming.

In this organization some feed crops, barley and oats, are sold. The sale of these accounts for about 34 per cent of the income from crops. The main sources of livestock income are from the dairy and hog enterprises. The income from these includes more than 90 per cent of that from livestock. Poultry is not important.

Table 14

Statement of Receipts and Expenses and Returns to the Organization Above Variable Expenses on Typical 160-Acre Farms in Part a, Stearns County

Receipts					
Crops					
Oats	244 bu.	at	$0.35	$ 85	
Barley	174 bu.	at	0.55	96	
Wheat	187 bu.	at	1.20	224	
Rye	165 bu.	at	0.75	124	
Total sales of crops					$529
Livestock					
Butterfat, 2,160 lb.		at	$ 0.45	$972	
3 cows		at	60.00	180	
5 veal calves		at	10.00	50	
Beef cattle, 700 lb.		at	0.06	42	
Hogs, 6,000 lb.		at	0.09	540	
Eggs, 400 doz.		at	0.20	80	
Poultry, 225 lb.		at	0.15	34	
Total sales of livestock					$1,898
Total sales of crops and livestock					$2,427
Expenses					
Threshing				$ 66	
Twine				17	
Labor				250	
Supplementary feeds				80	
Seeds				10	
Miscellaneous livestock expense				18	
Total variable cash expenses					$ 441
Returns to organization above variable expenses					$1,986

The indicated returns of $1,986 from this organization are not net and should not be so considered. No charges have been included for machinery expense, taxes, insurance, interest, and repairs, which would be about the same on farms of the same size. They may be disregarded for the comparison, but would have to be taken out to get the net income. It is necessary to consider only the expenses that vary, when comparing the returns from one farm with those of similar farms of the same size and in the same locality.

It should be further understood that these returns are figured on an average basis and do not represent, necessarily, what a particular individual might obtain. As indicated above, about 40 per cent of the farmers on farms of this size followed this organization. Among this group, some farmers are more efficient than others, and make more from this organization than do the poorer ones. If, however, the returns of all the farmers, both good and poor, were averaged, the results would correspond very closely to those shown in the table.

The returns from the other two organizations used in the illustration were obtained by using the same yields and prices, and may be compared with this organization in the following:

Organization with 45 acres of feed crops.....$1,743
Organization with 65 acres of feed crops.....$1,986
Organization with 85 acres of feed crops.....$2,072

At average yields and prices, the results indicate the greatest return from the organization with the largest acreage of feed crops, and the least return for the one with the smallest acreage of feed crops.

Following this procedure, it is possible to determine fairly accurately the approximate average returns that can be expected from any organization that might be handled on farms of the same size. Such a method of attack will enable farmers, county agents, or others to determine which of any number of organizations will be likely to be most profitable under the physical and economic conditions of production existing in any particular locality or on any particular farm.

Because in this area the principal income from livestock comes from the sale of pork and butterfat, changes in the amount of these two products are used to illustrate the effect of changing prices upon returns. For this purpose the organization for the 160-acre farm, Table 13, is used and a comparison made between changing the number of cows and sows handled.

Table 15

Effect of Varying Prices of Hogs and Butterfat on Returns from Certain Possible Organizations on 160-Acre Farms in Part a, Stearns County

Item	Probable returns above variable expenses with changes in the organization and in the prices of pork and butterfat as indicated				
	5-year average prices 1923-28	High butterfat and average hog prices	Low butterfat and average hog prices	High hog and average butterfat prices	Low hog and average butterfat prices
Butterfat, per lb.	$0.45	$0.55	$0.35	$ 0.45	$0.45
Hogs, per cwt.	9.00	9.00	9.00	12.00	6.00
1. Present organization having 12 cows and 4 sows..	$1,986	$2,202	$1,770	$2,166	$1,806
2. Same as 1 except cows increased to 19.....	2,114	2,514	1,830	2,352	2,007
3. Same as 1 except sows increased to 6	2,142	2,346	1,891	2,392	1,822

In Table 13 it is stated that the organization with 65 acres of feed crops had 12 cows and 4 sows and sold 2,160 pounds of butterfat and 6,000 pounds of pork. This organization is designated as 1 in Table 15, and the returns show the probable income from this organization at the prices of butterfat and hogs used. The prices of the other products sold are kept constant, or the same as the five-year average.

Organization 2 in the table is the same as 1 except instead of selling both oats and barley the cows are increased so as to consume all the surplus grain. This results in keeping 19 cows and selling 3,420 pounds of butterfat instead of 2,160 pounds as in 1. The hogs are kept constant, or the same as in 1. To take care of these added cows it is necessary to purchase some additional hay and supplementary feeds, also to increase the miscellaneous livestock expense and the labor charge slightly. All these differences in expense are taken out in calculating the returns at the varying prices of butterfat and hogs for organization 2.

In organization 3 the oats and barley are fed to hogs instead of to cows. This necessitates an increase in the number of sows to 6 and the selling of 9,000 pounds of pork instead of 6,000 pounds as in the other two organizations. The number of cows is kept constant, the same as in 1. A slight additional expense for tankage is necessary to take care of the added hogs, and this has been taken into account in calculating the probable returns at the different prices. This table illustrates the effect of changing prices of butterfat and hogs upon the returns from organizations selling varying amounts of such products.

At the average prices of butterfat and hogs during the five-year period, 1923-1928, the results in the first column indicate that if the grain sold in organization 1 is fed to dairy cows or to hogs, somewhat better returns can be expected, as shown for organizations 2 and 3. If

butterfat prices are higher, as indicated in the second column of the table, and other prices, including hogs, are normal, it becomes even more profitable to increase the number of cows to take care of all of the feed grains sold.

On the other hand, if the price of butterfat is low and that of hogs and other animal products is normal, the results in the third column of the table suggest that it will be slightly more profitable to feed the extra grain to hogs and not increase the dairy cows. If the price of hogs is high and that of butterfat and other products is normal, the results in the fourth column indicate that if the hogs are increased to use the grain there is practically no difference in the returns between organizations 2 and 3. With the prices of hogs low and prices of butterfat normal, the returns to be expected from organization 2 are better than from either of the other two organizations, as indicated in the fifth column.

In other words, the table simply illustrates that as prices change the returns to be expected from different organizations likewise change. If a farmer is to take advantage of changing economic conditions he must take changing price relationships into account when determining what is best for him to do in any particular year. Following the same procedure, county agents and others can determine, in the light of existing conditions, about what effect changing prices will have upon the different organizations followed on the different-sized farms in each area.

Crop Yields in the Area

In Table 16 are given the ten-year average yields, 1919-28, for different crops by counties, for Parts a, b, and c, in Area I. By using county data, a more local application of this method can be made. With yields in a community or from an individual farm, the same procedure can be followed. Because of the variations in yields within an area, it is desirable to use yields as nearly representative of an individual's condition as possible, as well as prices that are likely to be received.

Table 16

Average Crop Yields for the Ten-Year Period, 1919-28, for Eight Principal Crops, by Counties, in Area I for Parts a, b, c*

Area I, a

	Corn	Wheat	Oats	Barley	Rye	Flax	Potatoes	Hay
	bu.	bu.	bu.	bu.	bu.	bu.	bu.	tons
Carver	44	18	44	33	20	9	118	1.74
Dodge	34	12	36	28	17	9	105	1.44
Freeborn	40	15	42	33	21	12	126	1.38
McLeod	40	15	43	33	22	10	106	1.51
Meeker	37	14	38	31	20	10	102	1.47
Rice	41	16	39	32	21	11	93	1.58
Scott	42	18	40	31	21	10	101	1.48
Stearns	34	14	35	31	18	10	98	1.41
Steele	38	15	39	33	20	10	105	1.46
Waseca	39	14	35	28	19	10	90	1.63
Wright	35	17	36	31	20	10	97	1.69
Average for area	38	15	38	31	20	10	104	1.51

Area I, b

	Corn	Wheat	Oats	Barley	Rye	Flax	Potatoes	Hay
	bu.	bu.	bu.	bu.	bu.	bu.	bu.	tons
Anoka	32	12	35	29	15	10	99	1.31
Benton	31	12	36	29	16	10	103	1.40
Cass	26	13	31	25	17	8	112	1.42
Chisago	33	17	39	30	18	9	107	1.69
Crow Wing	29	13	33	28	17	9	113	1.40
Hennepin	37	15	36	30	19	10	113	1.56
Isanti	32	15	36	27	17	9	91	1.37
Kanabec	29	14	39	32	18	10	98	1.54
Mille Lacs	29	14	40	32	19	11	97	1.48
Morrison	30	13	32	27	14	9	105	1.40
Pine	30	14	38	29	21	10	110	1.52
Ramsey	36	17	39	27	16	9	113	1.50
Sherburne	28	12	32	27	13	8	91	1.30
Todd	31	13	35	29	17	10	97	1.45
Washington	33	15	35	29	18	9	106	1.57
Average for area	32	14	35	29	16	10	102	1.46

Area I, c

	Corn	Wheat	Oats	Barley	Rye	Flax	Potatoes	Hay
	bu.	bu.	bu.	bu.	bu.	bu.	bu.	tons
Aitkin	30	14	37	28	18	10	104	1.59
Beltrami	28	16	34	29	16	10	128	1.50
Carlton	30	14	38	29	16	9	108	1.54
Cook	30	15	29	29	..	10	120	1.57
Itasca	29	16	34	29	19	9	126	1.80
Koochiching	29	17	38	29	18	9	129	1.66
Lake	30	16	29	27	..	10	114	1.75
Lake of Woods	29	19	36	27	17	9	122	1.59
St. Louis	27	17	37	31	20	10	134	1.72
Average for area	29	16	36	29	17	10	122	1.63

* Compiled from State Census Reports.

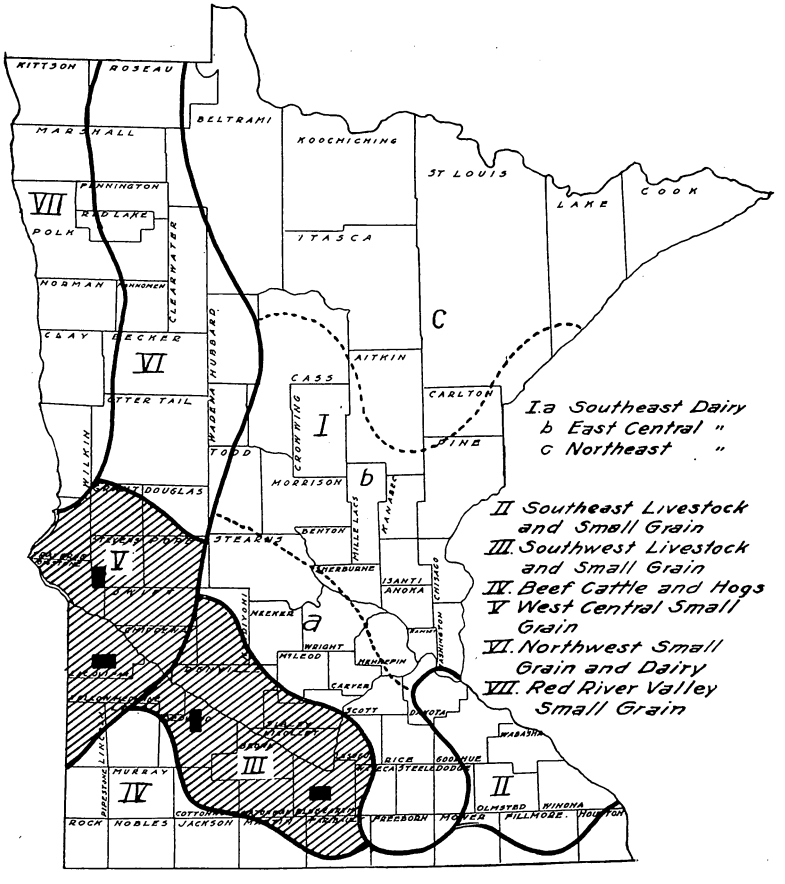

Fig. 5. Type-of-Farming Areas in Minnesota

Heavily shaded portions are townships from which data were taken in the study of Areas III and V.

SOUTHEAST LIVESTOCK AND SMALL-GRAIN AREA, AREA II

Because of a similarity of conditions in Areas II and III and because of an increasing tendency on the part of farmers in Area II to expand the dairy enterprise, no detailed study of this area is presented. The results presented in the studies of Areas III and V may be suggestive for Area II.

SOUTHWEST LIVESTOCK AND SMALL-GRAIN AREAS, AREAS III AND V

Description of Areas

The general conditions governing the production of agricultural commodities is quite similar throughout Areas III and V, except in precipitation and temperature. It is because of the variation in these factors that the systems of farming are different. Area III is the Southwest Livestock and Small-Grain, and Area V the West Central Small-Grain Areas.

In the agriculture of the Southwest Livestock and Small-Grain Areas, beef and dairy cattle and hogs are all important. In 1924 there were about two-thirds as many dairy cows as of all other cattle, altho when the young dairy cattle were added, the dairy cows outnumbered the beef cattle. Nearly one-fifth of the total livestock units were hogs. Sheep were unimportant. Corn was the most important crop from the standpoint of acreage, with wheat and rye next. The acreage of oats and barley was about the same as that of hay. A small acreage was given to flax and to some miscellaneous crops.

In 1925 the numbers of beef and dairy cattle in the West Central Small-Grain Area were about equal. Hogs were less numerous than in Area III, because less corn was grown. Some sheep were raised, altho they were relatively unimportant. Corn was less important from an acreage standpoint than either the small grain raised as a cash crop or that raised for feed. The hay and corn acreages were about equal. Some miscellaneous crops were grown.

The soil and topographic conditions of the region are well suited to the production of corn. Temperature is the limiting factor and causes a marked reduction in corn acreage north of the Minnesota River, which flows through the region from northwest to southwest. Hogs and beef cattle are numerous where corn is grown extensively, and small-grain growing and dairying are the most common systems of farming where corn is unimportant.

The annual precipitation varies from 30 inches in the southeastern part of Area III to 24 inches in the western part of Areas III and V. About 59 per cent of the precipitation in the western part comes between May 1 and August 31; about 56 per cent in the southeastern part comes in the same period. The length of the growing season is about 135 days in the western part and 145 days in the southeastern.

Shifts in the Acreage of Crops in Area III, 1879-1924

During the 45-year period from 1879 to 1924, significant changes in crop production occurred. There was a marked shift from wheat to

feed crops throughout the area. The shift was greatest where conditions for corn production were best.

The greatest change was in the acreage of wheat. Wheat dropped from 52.1 per cent in 1879 to 9.0 per cent in 1924. Hay decreased from 23.3 per cent to 18.2 and potatoes from 0.8 to 0.4. All the other crops increased. Corn increased from 9.9 per cent to 35.5; oats from 11.7 to 26.1; barley from 1.6 to 2.9; rye from 0.1 to 3.3; and flax from 0.5 to 3.2. The strictly cash crops dropped from 53.5 per cent of the crop land in 1879 to 15.9 in 1924. The increase in oats and corn together was more than the decrease in cash crops. Some shift was made from hay to the feed grains.

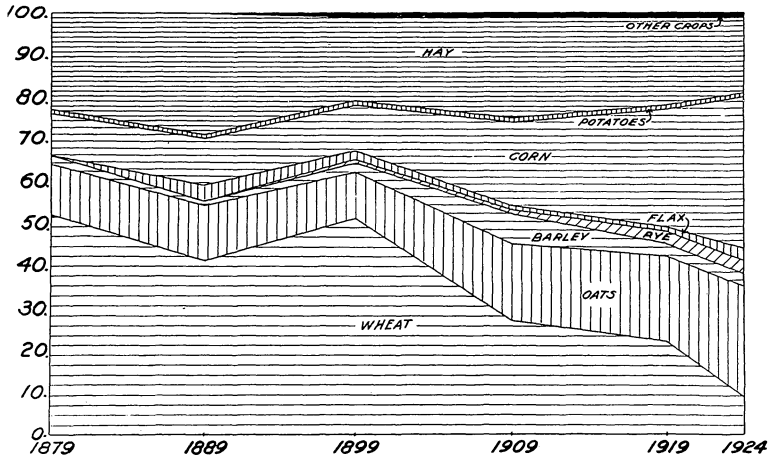

Fig. 6. Percentage of Crop Land Occupied by Crops Designated, 1879-1924

Shifts in the Number of Livestock in Area III, 1880-1925

The number of dairy cows per 100 acres in farms increased during the 45-year period except in 1900, when there was a decrease, and in 1920, when there was no change. There was very little change from 1910 to 1925. The number of other cattle increased per 100 acres in farms except in 1900 and in 1925, when there were slight decreases.

Table 17

Number of Head of Livestock per 100 Acres in Farms in Area III, 1880-1925*

	1880	1890	1900	1910	1920	1925
Dairy cows	2.4	3.4	3.2	4.0	4.0	4.2
Other cattle	3.8	4.7	4.6	4.8	6.8	6.1
Swine	0.7	1.1	1.2	1.6	2.7	3.2
Sheep	0.4	0.4	0.3	0.3	0.2	0.1
Horses	2.2	2.9	2.9	3.1	3.6	3.4

* Owing to different months in which the census was taken, these data are not strictly comparable. The error, however, is small.

The number of swine increased continuously throughout the period and at a faster rate than the acreage of corn.

Shifts in the Acreage of Crops in Area V, 1879-1924

Figure 7 shows that there was a marked decline in the relative importance of the wheat acreage from 1879 to 1924. Practically all of the decline occurred after 1899. Hay was the only other crop which had a significant decrease in acreage during the period, altho there was a decrease in flax during the 20-year period from 1899 to 1919, and in

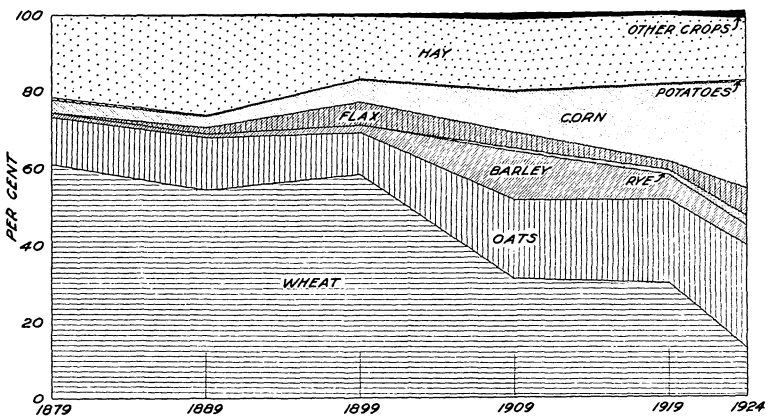

Fig. 7. Percentage of Crop Land Occupied by Crops Designated, 1879-1924

barley for the 15-year period from 1909 to 1924. Potatoes fluctuated throughout the period, but are relatively unimporant in this area. Wheat decreased in crop acreage from 1879 to 1924, from 61.0 per cent to 12.7; hay from 21.4 to 16.1; and potatoes from 0.7 to 0.3. Corn increased during the period from 3.3 per cent of the crop land to 27.8; oats from 12.2 to 26.6; barley from 1.2 to 5.1; rye from 0.1 to 2.5; and flax from 0.1 to 7.1. Miscellaneous crops occupied the rest of the crop land. The strictly cash crops occupied 61.8 per cent of the crop land in 1879 but dropped to 22.6 per cent by 1924.

Shifts in the Number of Livestock in Area V, 1880-1925

Table 18

Number of Head of Livestock per 100 Acres on Farms in Area V, 1880-1925*

	1880	1890	1900	1910	1920	1925
Dairy cows	1.2	1.1	1.8	2.5	2.5	2.5
Other cattle	2.0	3.7	2.9	3.4	5.8	5.6
Swine	0.2	0.3	0.8	0.8	1.7	2.2
Sheep	0.1	0.3	0.2	0.2	0.1	0.1
Horses	1.2	2.3	2.7	2.8	3.1	2.9

* Owing to different months in which the census was taken, these data are not strictly comparable. The error, however, is small.

Dairy cows increased in importance up to 1910, the later census reports showing no change. Other cattle had a greater increase than did dairy cows altho there was a small decrease from 1920 to 1925. Swine increased continuously, except in 1910, and at about the same rate as the corn acreage. Sheep increased during the first decade but later had a tendency to decrease. Horses increased continuously except from 1920 to 1925, when there was a decrease because of the use of motor power on the farms.

Typical Farm Organizations Followed (1925) in Areas III and V

Records of the Federal census were used as a basis for determining the typical organizations followed on farms of different sizes in the localities specified in the area. Four representative subareas, located in Redwood, Blue Earth, Lac qui Parle, and Stevens Counties, were selected. Each subarea included three or four townships. About 1,400 farms were considered.

In Tables 19 to 22 are given the farm organizations commonly found in the subareas designated. Below each table is given the percentage that each of the different sizes of farms constituted of the total number of farms. For example, the most common in Table 19 is the 160-acre farm, which constituted 45 per cent of all the farms. The 240-acre farm was the next most common, constituting 23 per cent of all farms, and so on. In the line "Frequency of type" is given the percentage of farms of the same size, having the specific organization indicated.

For a description of the method used in selecting the typical farming systems see page 10. For ways in which the systems may be used, see page 50.

Table 19

Typical Farming Systems on Farms of Different Sizes in Redwood County, Area III

Special Tabulations of the 1925 Census.

Item	Typical 80-acre farms*	Typical 120-acre farms*	Typical 160-acre farms*			Typical 240-acre farms*		Typical 320-acre farms*	
Frequency of type in per cent	90	85	15	30	55	46	51	49	51
Crops—									
Feed crops, acres	45	60	63	83	110	90	145	140	215
Corn, acres	20	35	30	40	50	40	65	75	100
Oats, acres	20	20	30	40	50	45	55	45	70
Barley, acres	..	..	..	..	..	..	15	10	25
Tame hay, acres	5	5	3	3	10	5	10	10	20
Wheat, acres	10	15	30	18	5	35	20	50	10
Flax, acres	..	7	8	5	3	15	5	15	10
Rye, acres	..	0 or 12†	10	8	0 or 10†	20	5	25	15
Potatoes, acres	¼	¼	¼	¼	¼	¼	¼	¼	¼
Wild hay, acres	8	12	15	10	7	20	5	20	10
Pasture, acres	10	15	25	25	20	40	40	50	40
Other land, acres	7	6	9	10	10	20	20	20	20
Livestock—									
Horses, number	4	4	4	5	5	6	7	8	10
Cows, number	5	7	7	8	8	10	12	11	12
Other cattle, number	3	5	4	4	6	6	9	9	18
Sows, number	2	5	3	5	6	6	8	7	12
Other hogs, number	0–20	0–25	0–15	10–40	10–50	10–30	10–75	10–60	5–75
Poultry, number	150	120	140	150	175	150	175	150	200
Per cent of farms having tractors	15	8	27	15	17	31	27	53	60

* The farms of different sizes represent the following percentages of all farms: 80-acre farms 5, 120-acre farms 5, 160-acre farms 45, 240-acre farms 23, 320-acre farms 10.

† About half have some.

Table 20

Typical Farming Systems on Farms of Different Sizes in Blue Earth County, Area III

Special Tabulations of the 1925 Census.

Item	Typical 40-acre farms*		Typical 80-acre farms*			Typical 120-acre farms*			Typical 160-acre farms*			Typical 200-acre farms*		Typical 240-acre farms*	
Frequency of type in per cent.....	46	54	20	55	25	25	42	30	30	46	22	49	47	44	56
Crops—															
Feed crops, acres.....	12	21	30	43	53	40	60	75	65	90	113	95	122	115	150
Corn, acres	6	12	12	20	30	15	30	40	32	45	70	45	70	60	85
Oats, acres	4	5	9	15	15	10	22	25	22	33	35	35	40	40	45
Barley, acres	..	..	..	..	..	5	..	..	..	..	..	..	..	..	..
Tame hay, acres.....	2	4	9	8	8	10	8	10	11	12	8	15	12	15	20
Wheat, acres	0 or 7†	2	10	5	5	12	10	8	15	10	7	28	15	35	18
Rye, acres	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0 or 15†
Potatoes, acres	½	½	½	1	½	½	¼	¼	½	¼	¼	¼	¼	¼	¼
Wild hay, acres.....	1	..	2	2	1	7	5	1	9	6	5	14	10	14	10
Other crops, acres.....	1	½	½	½	..	½	¾	..	..	..	..	..	..	..	..
Pasture, acres	16	12	25	21	15	45	35	28	45	45	25	48	40	60	45
Other land, acres.....	10	4	12	8	5	15	9	8	25	8	9	15	13	15	15
Livestock—															
Horses, number	2	2	3	3	4	4	4	5	5	6	6	6	6	7	8
Cows, number	3	4	7	8	8	8	9	9	11	11	10	10	10	14	12
Other cattle, number.....	2	2	5	4	5	4	5	5	5	5	5	9	9	10	10
Sows, number	1	2	2	4	6	3	5	7	6	9	10	9	12	9	10
Other hogs, number.....	0–4†	0–10	0–10	0–20	0–40	0–25	5–25	10–40	3–20	5–30	10–50	10–30	10–60	10–35	0–60
Poultry, number	90	100	120	140	125	125	125	150	145	150	140	150	200	190	160
Per cent of farms having tractors.....	8	3	0	6	4	4	12	20	15	33	30	30	37	14	50

* The farms of different sizes represent the following percentages of all farms: 40-acre farms 11, 80-acre farms 20, 120-acre farms 19, 160-acre farms 26, 200-acre farms 7, 240-acre farms 7.

† The common thing is to have none.

Table 21

Typical Farming Systems on Farms of Different Sizes in Lac qui Parle County, Area V

Special Tabulations of the 1925 Census.

Item	Typical 80-acre farms*	Typical 160-acre farms*			Typical 240-acre farms*		Typical 320-acre farms*		Typical 500-acre farms*
Frequency of type in per cent	60	30	46	24	56	43	40	60	90
Crops—									
Corn, acres	25	30	50	75	50	80	60	100	120
Oats, acres	20	35	35	35	50	50	60	70	100
Barley, acres	..	5	..	..	..	..	15	..	10
Wheat, acres	10	15	15	5	35	20	40	40	60
Rye, acres	..	..	..	..	10	10	20	..	10
Flax, acres	..	10	10	5	15	15	30	30	45
Potatoes, acres	⅕	¼	½	¼	½	¼	½	⅓	½
Tame hay, acres	3	10	5	4	5	10	10	15	45
Wild hay, acres	7	10	10	2	15	15	15	15	25
Pasture, acres	10	25	20	24	40	25	35	35	60
Idle land, acres	..	..	..	..	..	..	..	..	..
Other land, acres	5	20	15	10	20	15	35	15	25
Livestock—									
Horses, number	4	5	5	5	7	7	8	9	12
Cows milked, number	4	7	6	5	7	7	6	8	9
Other cattle, number	5	7	6	6	8	8	7	12	25
Sows, number	5	6	5	6	7†	10	10	12	12
Other hogs, number	0–20	0–40	0–50	0–50	0–50	5–100	7–50	0–80	5–85
Poultry, number	100	125	150	100	150	150	125	125	150
Per cent of farms having tractors	0	25	6	28	32	25	47	39	78

* The farms of different sizes represent the following percentages of all farms: 80-acre farms 5, 160-acre farms 34, 240-acre farms 21, 320-acre farms 17, 500-acre farms 3. Farms of other sizes were not significant enough in number to warrant organization set-ups.

† Several of these farms have few or no hogs. They may sell some corn.

Table 22

Typical Farming Systems on Farms of Different Sizes in Stevens County, Area V

Special Tabulations of the 1925 Census.

Item	Typical 160-acre farms*				Typical 220-acre farms*			Typical 280-acre farms*		Typical 320-acre farms*				Typical 480-acre farms*	Typical 640-acre farms*
Frequency of type in per cent	16	21	33	30	32	44	24	46	54	26	33	23	18	93	93
Crops—															
Wheat and flax, acres	0	15	30	60	25	40	70	30	70	30	55	75	100	130	140
Corn, acres	45	40	30	30	50	45	40	65	35	60	50	50	40	80	100
Oats, acres	30	40	40	30	40	40	40	60	50	70	60	60	45	90	75
Barley, acres	20	8	8	..	15	20	..	10	15	20	25	20	20	30	40
Rye, acres	.	..	6	..	5	..	10	15	15	..	15	..	15	30	60
Potatoes, acres	½	½	½	½	½	¼	¼	⅓	⅓	¼	½	½	½	½	½
Tame hay, acres	10	8	5	5	10	10	15	10	20	15	15	10	15	30	35
Wild hay, acres	..	4	10	5	10	20	5	15	5	20	20	20	15	20	30
Pasture, acres	38	30	20	25	40	30	30	50	45	60	40	40	35	35	90
Idle land, acres	6	10	..	..	10	5	..	15	5	10	20	20	10	15	40
Other land, acres	10	5	10	5	15	10	10	10	20	35	20	25	25	20	30
Livestock—															
Horses, number	5	5	5	5	6	6	8	8	6	8	7	8	8	9	10
Cows milked, number	4	6	5	3	6	6	6	6	5	6	5	5	6	8	8
Other cattle, number	7	8	6	3	10	10	5	10	5	10	9	8	8	15	25
Sows, number	4	6	4	3	8	6	2	10	3	8	6	10	5	10	7
Other hogs, number	0–40	0–60	0–30	0–20	0–45	0–30	0–30	6–35	0–10	5–45	0–45	0–50	0–40	0–50	0–50
Poultry, number	85	100	100	60	125	100	60	125	85	100	125	100	80	125	100
Per cent of farms having tractors	8	20	20	14	15	11	20	16	14	14	25	26	33	44	50

* The farms of different sizes represent the following percentages of all farms: 160-acre farms 26, 220-acre farms 15, 280-acre farms 9, 320-acre farms 35, 480-acre farms 4, 640-acre farms 4.

Use of Results in Determining Profitable Long-time Systems of Farming

Following the same method used in testing out the results for a particular system of farming indicated in Tables 13 and 14, returns have been calculated for typical organizations found in a representative township in Redwood County, Area III.. In this area the 160-acre farm was the most common. On farms of this size three organizations were usually found. The chief difference was in the amount of feed crops grown and the number of animals maintained. About 15 per cent of the farmers had 63 acres in feed crops, 30 per cent 83 acres, and 55 per cent 110 acres. (See Table 19.)

Table 23

Statement of Organization and Production of Crops and Livestock and Disposal of Crops on Typical 160-Acre Farms in Redwood County

Crops	Acres	Yield	Production	Requirements		Salable surplus
				Feed	Seed	
Corn—Silage	6	6 tons	36 tons	36 tons	..	..
Grain	44	35 bu.	1,540 bu.	985 bu.	10 bu.	545 bu.
Oats	45	35 bu.	1,575 bu.	700 bu.	135 bu.	740 bu.
Barley	5	29 bu.	145 bu.	..	10 bu.	135 bu.
Wheat	5	13 bu.	65 bu.	..	8 bu.	57 bu.
Flax	3	10 bu.	30 bu.	..	2 bu.	28 bu.
Rye	5	18 bu.	90 bu.	..	8 bu.	82 bu.
Tame hay	10	1.5 tons	15 tons	15 tons	..	..
Wild hay	7	1 ton	7 tons	7 tons	..	..
Pasture	20	..	..	..	..	..
Other land	10	..	..	..	..	..

Livestock	No.	Production	Sold	Feed requirements		Supplementary feeds
				Grain	Roughage	
				lb.	lb.	lb.
Horses	5	.....	.....	16,000	25,000	
Cows	8	7 calves	2 cows	9,600	16,000 hay	
		1,440 lb. butterfat	4 veal calves	.....	52,000 silage	
			1,440 lb. butterfat			
Other cattle	6	.....	1,000 lb. beef	1,500	3,000 hay 20,000 silage	
Sows	6	9,000 lb. pork	9,000 lb. pork	40,500	.....	1,350
Poultry	175	700 doz. eggs	700 doz. eggs	7,000		
		400 lb.	400 lb.	.....		

An estimate of the production of crops and livestock and of the disposal of the crops is shown in detail in Table 23 for the organization having 110 acres of feed crops. In Table 24 is shown the statement of receipts and expenses and the returns to the organization above variable expenses for this system of farming. The returns for the

other two organizations on the 160-acre farms—one with 63 acres of feed crops and one with 83 acres—are calculated in the same way, but only the returns to the organizations are shown.

The probable returns that can be expected from these organizations with specified yields and prices are given. The crop yields were those recorded in the township from which the data were taken. The same rate of production for livestock has been used for the different systems.

In this organization, about $900 worth of crops were sold. Corn and oats are most important, accounting for 70 per cent of the total income from crops. Small amounts were received from the sale of wheat, barley, flax, and rye. The hogs and butterfat accounted for 77 per cent of the income from livestock. Small amounts were received from the sale of cattle, poultry, and eggs.

Table 24

Statement of Receipts, Expenses, and Returns to the Organization Above Variable Expenses on Typical 160-Acre Farms in Redwood County

Receipts					
Crops					
Corn	545 bu.	at	$0.70	$382	
Oats	740 bu.	at	0.35	259	
Barley	135 bu.	at	0.55	74	
Wheat	57 bu.	at	1.20	68	
Flax	28 bu.	at	2.00	56	
Rye	82 bu.	at	0.75	62	
Total sales of crops					$ 901
Livestock					
Butterfat	1,440 lb.	at	$0.45	$648	
2 cows		at	60.00	120	
4 veal calves		at	10.00	40	
Beef	1,000 lb.	at	0.06	60	
Hogs	9,000 lb.	at	0.09	810	
Eggs	700 doz.	at	0.20	140	
Poultry	400 lb.	at	0.15	60	
Total sales of livestock					$1,878
Total sales of crops and livestock					$2,779
Expenses					
Threshing				$ 82	
Twine				19	
Labor				300	
Supplementary feeds				40	
Seeds				35	
Miscellaneous livestock expense				30	
Total variable cash expenses					$ 506
Returns to organization above variable expenses					$2,273

The returns from the other two organizations used in the illustration were obtained by using the same yields and prices, and may be compared with the most common organization in the following:

Organization with 63 acres of feed crops..... $1,987
Organization with 83 acres of feed crops..... $2,130
Organization with 110 acres of feed crops..... $2,273

At average yields and prices, the results indicate the greatest return from the organization with the largest area of feed crops, and least for the one with the smallest area of feed crops, the difference, however, is small.

Effect of Changing Prices on Returns

The effect that changing prices may have on the returns from the same as well as different organizations is illustrated in Table 25.

Table 25

Returns from the Three Organizations on Typical 160-Acre Farms in Redwood County at Various Prices for Different Products

Item	Probable returns above variable expenses with changes in organization when prices of corn, barley, and hogs are as indicated				
	5-year average prices	High grain and low hog prices	High hog and low grain prices	Low hog and average grain prices	High grain and average hog prices
Corn, bu.	$0.70	$1.00	$0.50	$0.70	$1.00
Barley, bu.	0.55	0.75	0.40	0.55	0.75
Hogs, cwt.	9.00	6.00	12.00	6.00	9.00
1. Present organization having 6 sows selling 545 bu. corn and 135 bu. barley..	$2,273	$2,193	$2,402	$2,003	$2,463
2. Same as 1 except has 11 sows and sells no corn or barley	2,475	1,980	2,950	1,980	2,475
3. Same as 1 except has 3 sows and sells 905 bu. corn and 135 bu. barley.....	2,131	2,294	2,064	1,996	2,426

The organization having 110 acres of feed crops is again used. Reference to Table 23 will show that this organization had six sows and sold 545 bushels of corn and 135 bushels of barley. In order to show the effect on returns when both more and less of corn, barley, and hogs are sold, the returns from this organization, adjusted to include these changes, are calculated. Organization 2, it will be noted, is the same as 1 (the actual organization used) except that hogs are increased to take care of all the corn and barley so that none would be sold. Organization 3, likewise, is the same as 1, except the hogs have been reduced by half and the surplus corn and barley were sold.

The prices used in the first column of the table are estimated five-year average prices, which were believed to be representative in the

area. These prices were used for determining the returns from adjustments possible to make in the organization. In the second column the prices of grain have been increased and the prices of hogs decreased. In the third column are shown the returns with high prices for hogs and low prices for grains, and in the fourth column the returns with average prices for grain and low prices for hogs. In the fifth column the prices of grain are high and the prices of hogs are considered average. This change in prices, it will be noted, has resulted in a change in the returns from the three organizations indicated. With average prices the organization selling no corn or barley showed highest returns. The organization selling grain and the least livestock becomes the most profitable with high grain and low hog prices, as shown in the second column. On the other hand, with low grain and high hog prices, as shown in the third column, the organization having most livestock and selling no corn or barley, shows to best advantage. There is little difference in the returns from the three organizations indicated, with low hog and average grain prices or average hog and high grain prices, as indicated in the fourth and fifth columns.

In other words, this table simply illustrates that as prices change the returns to be expected from different organizations likewise change. If a farmer is to take advantage of changing economic conditions he must take changing price relationships into account when determining what is the best thing for him to do in any particular year.

Crop Yields in the Areas

In Table 26 are given the last ten-year average yields for different crops, by counties, for Areas III and V. By using county data, a more local application of this method can be made. With yields in a community or from an individual farm, the same procedure can be followed. Because of the variation in yields within an area, it is desirable to use yields as nearly representative of an individual's condition as possible, as well as prices likely to be received.

Table 26

Average Crop Yields for the Ten-Year Period, 1919-1928, for Each County and for Areas III and V*

Area III

	Corn	Wheat	Oats	Barley	Rye	Flax	Potatoes	Hay
	bu.	bu.	bu.	bu.	bu.	bu.	bu.	tons
Blue Earth	39	16	38	32	21	11	108	1.66
Brown	38	14	37	29	18	12	88	1.49
Cottonwood	33	13	33	27	16	11	98	1.23
Faribault	38	13	40	33	19	12	112	1.32
Kandiyohi	36	13	34	29	16	10	97	1.39
Le Sueur	40	16	41	31	21	12	108	1.66
Nicollet	40	15	37	29	20	10	100	1.58
Redwood	35	13	35	29	18	10	92	1.29
Renville	35	12	34	28	17	10	100	1.44
Sibley	41	15	37	30	19	11	101	1.40
Watonwan	38	15	38	30	18	12	86	1.43
Average for area	37	14	37	29	18	11	101	1.44

Area V

	Corn	Wheat	Oats	Barley	Rye	Flax	Potatoes	Hay
	bu.	bu.	bu.	bu.	bu.	bu.	bu.	tons
Bigstone	31	11	31	24	15	9	99	1.30
Chippewa	33	13	33	27	18	10	86	1.43
Grant	31	12	32	28	14	9	91	1.25
Lac qui Parle	32	12	34	20	17	10	84	1.43
Lincoln	32	11	33	25	15	10	101	1.36
Pope	32	12	33	26	15	10	95	1.18
Stevens	32	12	33	26	15	9	80	1.22
Swift	30	11	32	25	14	8	98	1.22
Traverse	28	11	31	25	15	9	82	1.18
Yellow Medicine	34	14	36	30	17	10	87	1.46
Average for area	32	12	33	26	16	9	91	1.29

* Compiled from State Census Reports.

BEEF CATTLE AND HOG AREA, AREA IV

Description of Area

Agriculture in the beef cattle and hog area of Minnesota is characterized by the production of large amounts of corn, beef, and pork. The production of dairy products is more important in the eastern end of the area than in any other part. The topography there is such that much of the land can be utilized most economically as pasture, which aids in the production of dairy products; altho some beef cattle are fattened on pasture. This is the heaviest beef- and pork-producting area in Minnesota and forms a part of the national corn belt. In the eastern part of the area more cash crops are sold, principally wheat and rye. Some feed grains are sold in the western part of the area.

Most of the soil is of glacial origin. In the extreme southeastern part of the state is a small stretch of land which was not glaciated.

Directly west of this is a glaciated district over which a thick layer of wind-blown soil has been deposited. In the extreme southwestern corner, the early glacial deposits have been covered with loess to a depth of several feet. On the whole, the soil in this area is very productive.

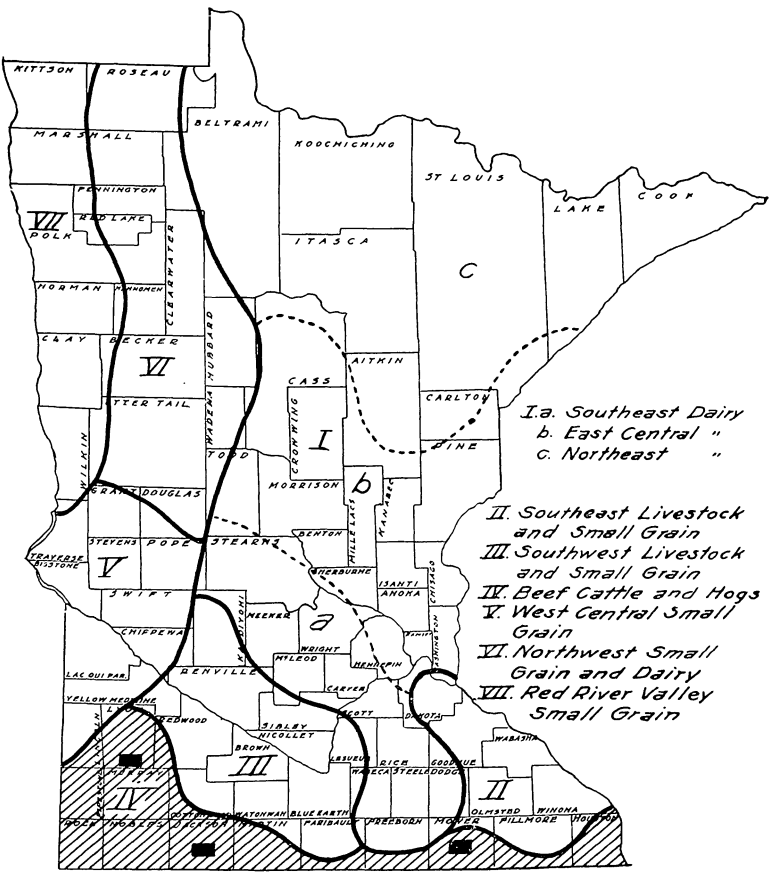

Fig. 8. Type-of-Farming Areas in Minnesota
Heavily shaded portions are townships from which data were taken in the study of Area IV.

Most of the land surface is fairly level except in the extreme eastern part, where the topography interferes with cultivation to some extent. This area is comparatively free from lakes or other natural barriers which interfere with the size and shape of fields. The drainage is to the east and south.

The precipitation varies from 32 inches in the eastern part of the area to 24 inches in the western part. About 56 per cent of the precipitation in the eastern part falls between May 1 and August 31; in the western part only 52 per cent falls in that time. The growing season

varies from 130 days on some of the high land in the western part of the area to 160 days in the extreme southeastern part, along the Mississippi river. In the eastern part, during June, July, and August, prevailing winds are from the southeast; in the western part they are from the south, which, with less rainfall from May 1 to August 31, increases the risk in crop production.

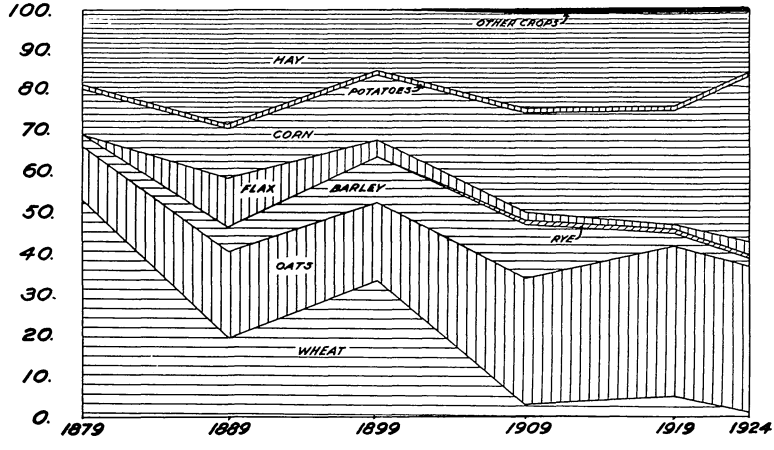

Fig. 9. Percentage of Crop Land Occupied by Crops Designated, 1879-1924

This area is well supplied with market facilities. Railroads furnish direct transportation to the leading market centers in the Middle West. There are direct routes to Chicago, Omaha, Sioux City, and the Twin Cities, which furnish an outlet for most of the surplus products. While direct routes connect this area with the large terminal markets, interior markets are developing to some extent within the area.

Shifts in the Acreage of Crops in the Beef Cattle and Hog Area, 1879-1924

In the 45 years from 1879 to 1924 significant changes occurred in the agriculture of this area. In 1879 the farmers depended to a large extent on the income from small grains, more than half of their crop lands being devoted to wheat production. Wheat has practically disappeared from this area. Less than one per cent of the crop land was in wheat in 1924. The shift has been from wheat to oats and corn largely, altho there has been some change in hay and barley. The decrease in crop land occupied by wheat was from 53.1 per cent in 1879 to 0.9 per cent in 1924; barley from 3.2 per cent to 1.7; hay from 19.4 per cent to 16.1. The crop land occupied by corn increased from 10.7 per cent to 40.2; oats from 13.3 per cent to 35.3; rye from 0.3 per cent to 0.7; flax from 0 per cent to 3.5; and potatoes from 0 per cent to 0.5.

The strictly cash crops decreased from 53.1 per cent in 1879 to 5.6 in 1924.

Shifts in the Number of Livestock in the Beef Cattle and Hog Area

Table 27

Number of Head of Livestock per 100 Acres in Farms in the Beef and Hog Area 1880 to 1925*

	1880	1890	1900	1910	1920	1925
Dairy cows	1.8	3.4	2.6	3.6	2.9	2.4
Other cattle	2.6	5.0	4.9	6.0	9.5	8.9
Swine	4.0	6.0	10.5	9.0	14.5	16.0
Sheep	0.4	0.4	0.7	1.1	0.3	0.2
Horses	1.9	2.7	2.9	3.2	3.7	3.4

* Owing to different months in which the census was taken, these data are not strictly comparable. The error, however, is small.

With the shift from cash grain to feed crops, there was an increase in the amount of livestock. Marked increases occurred in the number of beef cattle and hogs per 100 acres in farms. Hogs increased at about the same rate as the corn acreage. There was no increase in sheep or dairy cows after 1910. The number of horses and beef cattle declined somewhat in 1925.

Typical Farm Organizations Followed in Area IV (1925)

Three representative subareas, located in Lyon, Jackson, and Mower Counties, were selected for this study. Each subarea included three or four townships. About 900 farms were considered.

In Tables 28 to 30 are given the various farm organizations found in the subareas designated. Below each table is given the percentage of each of the different sized farms in relation to the total number of farms. For example, the most common size in Table 28 was 160 acres, constituting 52 per cent of all the farms. The 240-acre farm was the next most common in size, and constituted 13 per cent of all farms, and so on. In the line "Relative frequency of type" is given the percentage of farms of the same size having the specific organization indicated.

For a description of the method used in selecting the typical farming systems see page 10. For ways in which the systems may be used see footnote page 50.

Table 28

Typical Farming Systems on Farms of Different Sizes in Jackson County, Area IV

Special Tabulations of the 1925 Census.

Item	Typical 80-acre farms*	Typical 120-acre farms*	Typical 160-acre farms*			Typical 240-acre farms*		Typical 320-acre farms*	
Frequency of type in per cent	91	84	19	45	36	33	67	50	50
Crops—									
Feed crops, acres	60	95	85	115	130	130	170	200	250
Corn, acres	30	40	35	50	60	60	80	90	110
Oats, acres	20	40	35	45	50	50	70	80	100
Barley, acres	..	..	..	..	..	..	..	..	..
Tame hay, acres	10	15	15	20	20	20	20	30	40
Flax, acres	..	..	5	5	..	10	10	10	5
Potatoes, acres	¼	¼	¼	¼	¼	¼	¼	½	½
Wild hay, acres	..	..	20	5	..	20	15	30	5
Pasture, acres	15	20	40	30	25	65	35	65	50
Other land, acres	5	5	10	5	5	15	10	15	10
Livestock—									
Horses, number	4	4	6	6	6	6	6	10	10
Cows milked, number	6†	6†	9‡	9‡	7†	9§	8§	11§	8§
Other cattle, number	6	4	9	10	10	10	9	13	16
Sows, number	6	6	7	9	9	6	8	12	9
Other hogs, number	5–50	5–30	5–75	10–80	10–95	10–60	20–100	15–140	15–150
Poultry, number	100	100	100	125	125	125	125	150	125
Per cent of farms having tractors	10	..	31	24	17	23	38	41	41

* The farms of different sizes represent the following percentages of all farms: 80-acre farms 8, 120-acre farms 8, 160-acre farms 52, 240-acre farms 13, 320-acre farms 11.

† About 20 per cent of the cows milked were beef cows.

‡ About 45 per cent of the cows milked were beef cows.

§ About 30 per cent of the cows milked were beef cows.

Table 29

Typical Farming Systems on Farms of Different Sizes in Lyon County, Area IV

Special Tabulations of the 1925 Census.

Item	Typical 80-acre farms*	Typical 120-acre farms*	Typical 160-acre farms*			Typical 240-acre farms*		Typical 320-acre farms*	
Frequency of type in per cent	95	93	29	51	20	48	52	41	59
Crops—									
Feed crops, acres	55	90	85	110	140	130	175	190	240
Corn, acres	25	40	40	50	65	50	80	85	110
Oats, acres	25	40	40	50	65	60	75	95	100
Barley, acres	..	..	..	..	..	5	5	..	..
Tame hay, acres	5	10	5	10	10	15	15	10	30
Flax, acres	..	..	..	..	..	..	..	5	5
Potatoes, acres	¼	¼	¼	¼	¼	½	½	¼	¼
Wild hay, acres	5	5	10	5	3	30	20	30	20
Pasture, acres	15	20	50	35	10	50	30	75	35
Other land, acres	5	5	15	10	7	30	15	20	20
Livestock—									
Horses, number	4	4	5	5	5	7	8	9	10
Cows milked, number	4†	6‡	7§	6†	4§	6§	5†	6‡	6§
Other cattle, number	4	6	9	6	5	15	15	20	15
Sows, number	3	3	8	6	6	8	10	10	10
Other hogs, number	0–40	0–50	0–40	0–40	0–45	10–75	10–75	0–50	0–100
Poultry, number	50	125	100	100	75	100	100	125	125
Per cent of farms having tractors	5	18	6	24	34	19	14	..	..

* The farms of different sizes represent the following percentages of all farms: 80-acre farms 7, 120-acre farms 9, 160-acre farms 39, 240-acre farms 19, 320-acre farms 12.

† About 95 per cent of the cows milked were beef cows.

‡ About 70 per cent of the cows milked were beef cows.

§ About 80 per cent of the cows milked were beef cows.

Table 30

Typical Farming Systems on Farms of Different Sizes in Mower County, Area IV

Special Tabulations of the 1925 Census.

Item	Typical 80-acre farms*		Typical 120-acre farms*		Typical 160-acre farms*		Typical 200-acre farms*		Typical 240-acre farms*		Typical 320-acre farms*
Frequency of type in per cent	50	50	35	63	45	51	51	49	42	53	94
Crops—											
Feed crops, acres	40	60	65	85	95	110	115	150	125	165	180
Corn, acres	20	20	25	25	30	35	40	50	40	45	60
Oats, acres	15	27	25	35	40	50	45	65	60	80	90
Barley, acres	..	..	..	..	..	..	..	..	..	..	..
Tame hay, acres	5	13	15	25	25	25	30	35	25	40	30
Flax, acres	2	..	5	5	10	10	10	15	15	20	25
Potatoes, acres	1	½	½	2	2	2	1	1	1	5	1
Wild hay, acres	..	..	..	..	..	..	..	..	..	..	..
Pasture, acres	32	15	40	20	38	28	59	25	84	40	90
Other land, acres	5	5	10	8	15	10	15	9	15	10	24
Livestock—											
Horses, number	3	3	4	4	5	6	7	7	8	8	9
Cows milked, number	5	5‡	8†	5	8§	9‖	13‖	8¶	11§	10§	14§
Other cattle, number	5	5	8	6	10	12	15	12	20	20	25
Sows, number	2	3	3	4	5	5	7	8	5	5	8
Other hogs, number	0–15	0–20	0–20	0–40	0–40	0–40	0–30	0–50	0–35	0–45	0–60
Poultry, number	50	100	125	125	100	100	100	100	100	125	125
Per cent of farms having tractors	13	..	20	10	15	24	32	40	25	20	44

* The farms of different sizes represent the following percentages of all farms: 80-acre farms 15, 120-acre farms 15, 160-acre farms 30, 200-acre farms 10, 240-acre farms 12, 320-acre farms 5.

† About 50 per cent of the cows milked were beef cows.

‡ About 70 per cent of the cows milked were beef cows.

§ About 60 per cent of the cows milked were beef cows.

‖ About 80 per cent of the cows milked were beef cows.

¶ About 85 per cent of the cows milked were beef cows.

USE OF RESULTS IN DETERMINING PROFITABLE LONG-TIME SYSTEMS OF FARMING

Following the same method used in testing the results from particular systems of farming previously discussed, returns have been calculated for typical organizations in a representative township in Jackson County, Area IV. The 160-acre farm was the most common. On farms of this size three organizations were usually found. The chief difference was in the amount of feed crops grown and the number of animals maintained. Nineteen per cent of the farmers followed an organization with 85 acres of feed crops, 45 per cent with an organization with 115 acres of feed crops, and 36 per cent with an organization with 130 acres of feed crops. (See Table 28.)

Table 31

Statement of Farm Organization and Production of Crops and Livestock and Disposal of Crops on Typical 160-Acre Farms in Jackson County

Crops	Acres	Yield	Production	Requirements		Salable surplus
				Feed	Seed	
Corn	52	34 bu.	1,768 bu.	1,413 bu.	10 bu.	345 bu.
Silage	8	6 tons	48 tons	48 tons	..	..
Oats	50	36 bu.	1,800 bu.	1,140 bu.	150 bu.	510 bu.
Tame hay	20	1.5 tons	30 tons	30 tons	..	..
Pasture	25	..	..	..	..	..
Other land	5	..	..	..	..	..

Livestock	No.	Production	Sold	Requirements for feed			Supplementary feeds
				Grain	Roughage	Silage	
				lb.	lb.	lb.	lb.
Horses	6	.....	.....	19,200	30,000		
Cows	7	1,260 lb. butterfat	2 cows 1,260 lb. butterfat	8,400	14,000	42,000	
Other cattle	10	7 calves	1 veal calf 2,800 lb. beef	21,400	16,000	49,400	
Sows	9	13,500 lb. pork	13,500 lb. pork	64,225	.....	.....	1,215
Poultry	125	500 doz. eggs 300 lb.	500 doz. eggs 300 lb.	5.000			

An estimate of the production of crops and livestock and the disposal of crops is shown in detail in Table 31 for the organization having 130 acres of feed crops. It should be noted that there is a surplus of corn and oats over that needed for feed, and that this is sold. In Table 32 is a statement of the receipts and expenses and the returns to the organization in excess of variable cash expenses for this system. The returns for the other two organizations on the 160-acre farms—one with 85 acres of feed crops and one with 115 acres—are calculated in the same way, but only the returns to the organizations are shown.

The probable returns that can be expected from these organizations with specified yields and prices are given.

The crop yields used were those recorded in the township from which the data were taken. The same rate of production of livestock was used for each of the different systems.

In this organization some corn and oats were sold. Table 28 indicates that 20 per cent of the cows milked were classed as beef cows. It is likely that most of them were of the beef breeds as the production of butterfat was only 180 pounds per cow. The main sources of income were hogs and cattle. A small amount came from the sale of poultry and poultry products.

Table 32

Statement of Receipts, Expenses, and Returns to the Organization Above Variable Expenses on Typical 160-Acre Farms in Jackson County

Receipts					
Crops					
Corn	345 bu.	at	$0.70	$242	
Oats	510 bu.	at	0.35	178	
Total sales of crops					$ 420
Livestock					
Butterfat	1,260 lb.	at	$0.45	$567	
2 cows		at	60.00	120	
1 veal calf		at	10.00	10	
Beef cattle	2,800 lb.	at	0.06	168	
Hogs	13,500 lb.	at	0.09	1,215	
Eggs	500 doz.	at	0.20	100	
Poultry	300 lb.	at	0.15	45	
Total sales of livestock					$2,225
Total sales of crops and livestock					$2,645
Expenses					
Threshing				$ 72	
Twine				15	
Labor				360	
Supplementary feeds				36	
Seeds				40	
Miscellaneous livestock expense				45	
Total variable cash expenses					$ 568
Returns to organization above variable expenses					$2,077

The returns from the other two organizations used were obtained by using the same yields and prices, and may be compared with the one having 130 acres of feed crops in the following:

1. Organization with 85 acres of feed crops..... $1,594
2. Organization with 115 acres of feed crops..... $2,058
3. Organization with 130 acres of feed crops..... $2,077

The results indicate that, with average yields and prices which have been obtained in this area, greater returns can be expected from the

organizations with the largest area of feed crops, but that there is not much difference in returns between organizations 2 and 3. Such differences as do exist are in favor of the one with the larger area of feed crops.

Following this procedure, it is possible to determine fairly accurately the approximate returns to be expected on the average from any organization which might be handled on farms of this size.

Effect of Changing Prices on Returns

In Table 33 is shown the effect that price changes have on the returns from the same as well as from different farming systems. Only the prices of hogs and corn have been changed in this table. As hogs constitute the most important source of income in this area, the question of feeding hogs or selling corn is an important one.

Table 33

Effect of Changing Corn and Hog Prices on the Returns to Organization in Table 31, when Varying Amounts of Corn and Hogs Are Sold and when Amounts and Prices of Other Products Are Held Constant

Item	Returns to organization above variable expenses when prices of corn and hogs are			
	5-year average prices, 1924-28	High corn and low hog prices	High hog and low corn prices	Low hog and average corn prices
Corn, per bu.	$0.70	$1.00	$0.50	$0.70
Hogs, per cwt.	9.00	6.00	12.00	6.00
1. Present organization having 9 sows—selling 855 bu. grain	$2,077	$1,775	$2,412	$1,672
2. Same as 1 except 14 sows and selling no grain	2,318	1,688	2,948	1,688
3. Same as 1 except has only 5 sows and selling 1,365 bu. grain	1,911	1,939	1,962	1,682

In the first column of the table are the five-year average prices, 1924-28, received by farmers in Minnesota. These prices were used to obtain the returns from three organizations used in these calculations. Since hogs are the main source of income on the 160-acre farms in the locality from which the data were obtained, a comparison is made as to what the results would be by changing corn and hog prices and varying the amount of corn and hogs sold.

When the prices of corn and hogs are as indicated in the first column, organization No. 2, the one which sells no grain gives the greatest returns. When the price of corn is high and the price of hogs is low, No. 3, the organization selling the most grain gives the greatest returns, as indicated in the second column. On the other hand, when the price of hogs is high and the price of corn is low, No. 2, the

organization selling no grain gives greatest returns, as indicated in the third column. When the price of hogs is low and the price of corn is as indicated by the 5-year average, there is practically no difference in the returns from the three organizations. The ratio between the prices of livestock and feed crops is significant in making adjustments on livestock farms.

This table shows that as prices change the returns from the different organizations change. If a farmer is to use his economic advantage he must take changing prices into account when outlining his plan for any particular year.

In a similar way it is possible by use of the typical farm and the method used to determine, in the light of existing conditions, about what effect changes in price will have on the different organizations possible to have on a particular farm in a locality.

Crop Yields in the Area

In Table 34 are given the last ten-year average yields for different crops by counties in Area IV, and for the area as a whole. By using county data, a more local application of this method can be made. With yields in a community or from an individual farm, the same procedure can be followed. Because of the variation in yields within an area, it is desirable to use yields as nearly representative of an individual's condition as possible, as well as the prices likely to be received.

Table 34

Average Yields for the Ten-Year Period, 1919-1928, for Each County in Area IV and for the Area as a Whole*

	Corn	Wheat	Oats	Barley	Rye	Flax	Potatoes	Hay
	bu.	bu.	bu.	bu.	bu.	bu.	bu.	tons
Houston	43	15	38	29	20	12	106	1.78
Jackson	34	12	36	29	18	12	94	1.29
Lyon	33	13	34	25	15	10	94	1.40
Martin	37	16	33	30	18	11	95	1.32
Mower	35	11	36	29	18	10	93	1.48
Murray	31	11	34	29	16	11	89	1.30
Nobles	35	15	36	31	14	11	103	1.23
Pipestone	32	13	36	28	16	10	100	1.23
Rock	33	14	38	31	18	10	98	1.21
Average for area	34	13	35	28	17	11	97	1.38

* Compiled from State Census Reports.

APPLICATION OF AGRICULTURAL OUTLOOK MATERIAL TO TYPICAL SYSTEMS OF FARMING

A farmer can not be content merely with the selection of a system of farming to be followed over a period of years. Short-time adjustments in a general plan are necessary or desirable because of market prospects for certain products for a given year. The failure of a particular crop may necessitate some readjustment in his plans. Such a method as has been presented suggests some slight changes which may be made at little or no expense, but which will add to the income.

Agricultural Outlook statements are prepared annually for the purpose of helping farmers to make desirable adjustments. In these Outlook reports are assembled facts relating to world and national conditions which are not readily available to farmers. The statements contained in the Outlook are from a national point of view and may need to be modified to suit local conditions. The information is designed to aid farmers when planning their breeding or planting programs.

The "Budgeting" method demonstrated in this bulletin in connection with typical farming systems is useful in interpreting the Agricultural Outlook material and affords an opportunity to determine what adjustments would likely be most profitable in a given year.